

Before the  
**Federal Communications Commission**  
Washington, D.C. 20554

In the Matter of	)	
	)	
Mobility Fund Phase I Auction Scheduled for	)	AU Docket No. 12-25
September 27, 2012	)	
	)	
Comment Sought on Competitive Bidding	)	
Procedures for Auction 901 and Certain	)	
Program Requirements	)	
	)	

To: Chief, Wireless Telecommunications Bureau  
Chief, Wireline Competition Bureau

**REPLY COMMENTS OF POWER AUCTIONS LLC**

Power Auctions LLC hereby submits these reply comments in response to the February 2, 2012 Public Notice (“Public Notice”) of the Wireless Telecommunications and Wireline Competition Bureaus (“Bureaus”) seeking comment with respect to competitive bidding procedures in the Mobility Fund Phase I Auction (“Auction 901”) scheduled for September 27, 2012.<sup>1</sup>

Our reply comments consist mainly of the submission of a PowerPoint presentation made by Professor Lawrence M. Ausubel at the Transportation & Public Utilities Group at the Allied Social Science Associations conference in Chicago on January 6, 2012. A copy of the presentation is attached.

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<sup>1</sup> *Mobility Fund Phase I Auction Scheduled for September 27, 2012: Comment Sought on Competitive Bidding Procedures for Auction 901 and Certain Program Requirements*, Public Notice, DA 12-121 (rel. Feb. 2, 2012).

We also make four general comments.

First, we believe that the Bureaus are prematurely limiting attention to a single-round format on account that “it is simple and quick” (Public Notice, ¶26). There are good reasons why multiple rounds of bidding would be valuable to bidders and to accomplishing the goals of an efficient auction, including but not limited to:

- A single-round auction may be simple for the FCC, but it is not simple for a bidder. Formulating an appropriate bid for a sealed-bid auction is strategically much more complicated than bidding in a multiple-round auction.
- A bidder might find after a single round of bidding that her bids do not combine well with the other bids submitted; a multiple-round auction would enable her to adjust her geographic areas accordingly.
- A multiple-round auction helps bidders to economize on bid evaluation costs.
- A multiple-round auction would enable the FCC to achieve a higher number of road miles serviced within its \$300 million budget.

The attached PowerPoint presentation includes an outline of a multiple-round auction design for Auction 901. Simpler multiple-round auction designs (e.g., a uniform-price descending clock auction) are also possible. If there is not time to implement a multiple-round auction format for Auction 901, we would at least hope that a multiple-round auction would be adopted for subsequent related auctions.

Second, it is worth reemphasizing that an important feature of the Mobility Fund Auction environment is that it is *not* a binding constraint that a given census block can be awarded only to a single bidder. Obviously, overlap should be limited; but there is no legal problem analogous to

selling the same item twice. By doing so, the “fitting problem” associated with package bidding is made much less severe than in standard (forward) auctions.

Third, we believe that the comment and reply comment submitted by Alexandre Belloni, Sandro Brusco, Giuseppe Lopomo and Leslie M. Marx, as well as the reply comment submitted by David McAdams, make important points that should be seriously considered by the Bureaus.

Fourth, if attention must necessarily be limited to a sealed-bid auction for Auction 901, then we believe that the basic design described by Paul Milgrom and Assaf Eilat is fundamentally sound and should be seriously considered by the Bureaus.

Respectfully submitted,

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March 9, 2012

# Auction Design for Universal Service

Larry Ausubel  
University of Maryland  
6 January 2012

## Universal Service

- Historically:
  - Voice service in rural, remote or high-cost areas
- 21<sup>st</sup> century:
  - Fixed broadband ( $\geq 4$  Mbps downstream /  $\geq 1$  Mbps upstream) service in unserved areas
  - Mobile voice and broadband (3G or 4G) service in unserved areas
  - Alternative technologies (e.g. satellite) for the most remote areas
  - Voice service in rural, remote or high-cost areas

# Why Auctions?

## Why Auctions?

- The usual reason ...
  - ... consider the alternative!
  - The only serious alternative to auctions being put forward is an “economic model-based process” to determine the level of support
  - Requires a reliable model for estimating costs (unlikely, in unserved areas)
  - Requires a reliable model for estimating revenues (unlikely, in general)
  - In my experience, even the firms’ internal models for estimating spectrum license values are highly unreliable. If, instead, the firms’ models are intended for an external agenda (i.e. obtaining high levels of support), one can imagine the degree of unreliability that would result!

## Why Auctions? (continued)

- In addition:
  - Suppose that you had reasonably reliable models for estimating costs and revenues. There is still the question of what you would do with the models
  - If the FCC allowed rates of return that were too low, firms would withdraw from providing universal service
  - If the FCC allowed rates of return that were too high, there would remain the usual issue of how to select the winner — beauty contest?
  - The traditional expectation from the regulation literature is that the allowed rate of return would be too high (e.g. Averch and Johnson, 1962)

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## Why Auctions? (continued)

- Moreover:
  - There is also a large open issue as to the regulator's objective function in allocating universal service funds
  - For mobile services, the FCC's currently-stated objective is to *maximize the number of eligible road miles receiving coverage, subject to the budget* (see FCC 11-161, November 2011, ¶128)
  - Observe that this treats a road mile that is traveled by 1 vehicle/day the same as a road mile that is traveled by 1000 vehicles/day
  - (And note that the only reason one would do this is if one completely lacked any data on the amount of traffic on these roads — the missing data would also render the revenue model completely unreliable)
  - If the regulator's objective function is specified suboptimally, an auction will be somewhat self-correcting — e.g. by implicitly having estimates of revenues provided by bidders — tending to waste the universal service funds less than a non-competitively-based system

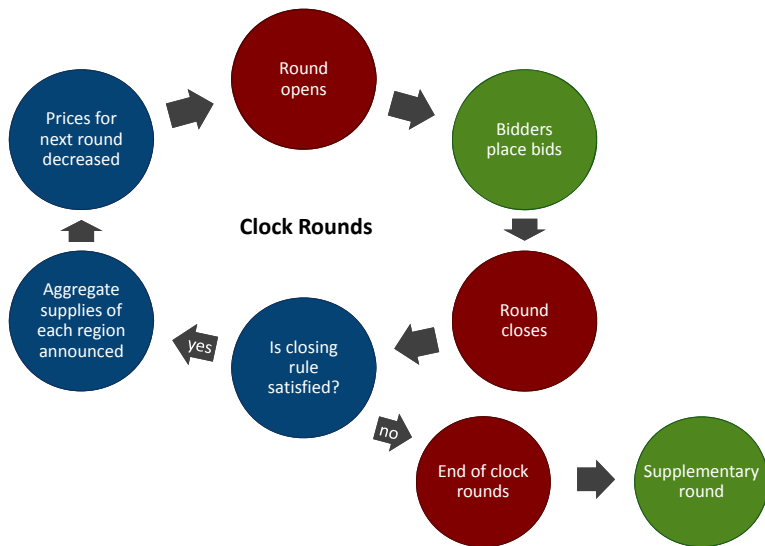
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# Auction Design

## Combinatorial Clock Auction

- Combinatorial Clock Auction (CCA)
  - This is the auction format that is currently being used in auctions for the sale of radio spectrum in the UK, Denmark, the Netherlands, Austria, Ireland and Australia
  - While all CCA applications to date have been as forward auctions, it is equally well defined as a reverse auction (to procure universal service)
  - The CCA comprises two stages: a clock auction; followed by a supplementary round
  - All bids are treated as package bids
  - The pricing rule is second-price in nature (“core-selecting auction”)
  - Originated in a paper by Ausubel, Cramton and Milgrom (2006)

## Round Structure

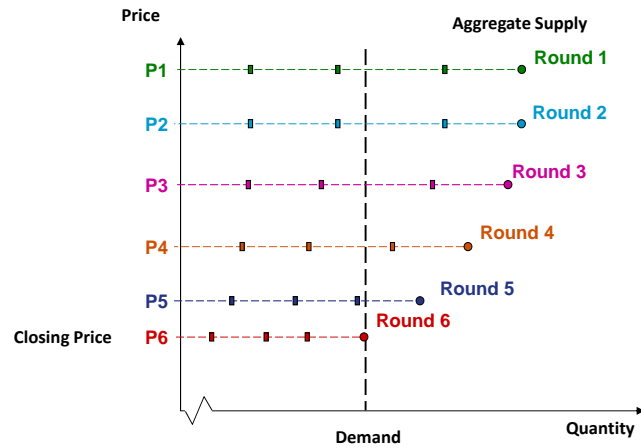


## Description of the Clock Auction Rounds

- The eligible service area is divided into “regions” (e.g. at the census tract level); each region is available in a quantity of one
- All regions are auctioned *simultaneously*
- In each round, the auctioneer announces the current price for each region; the prices tick downward, as a descending “clock”
- Bidders respond by bidding a quantity for each region (since regions are available in quantities of one, the bid is simply whether the bidder is “in” or “out”)
- Bidders have initial eligibilities based on qualification/deposits
- Each bidder must keep active to maintain its eligibility
- Prices decrease from round to round until stopping rule is met
- Stopping Rule: Auction does not end on *any* region until there is no excess supply in *all* regions and until the supply can be satisfied within budget

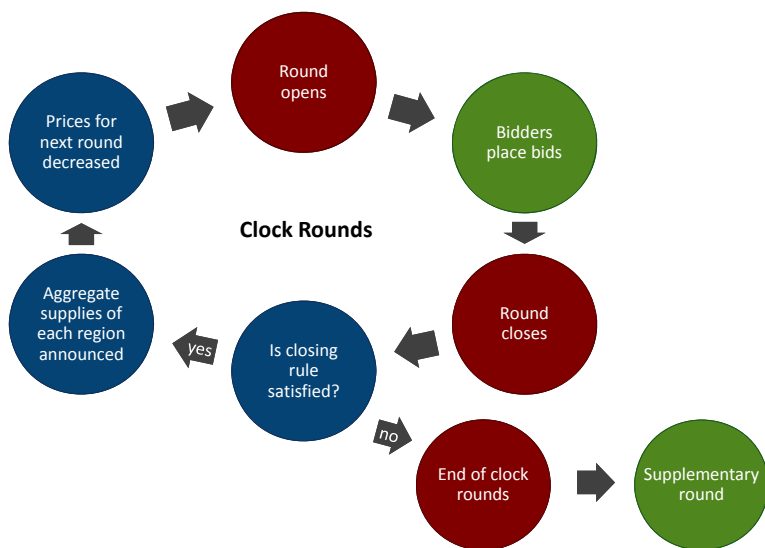
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## Auction mechanics



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## Round Structure



## Description of the Supplementary Round

- All bids from the clock auction rounds are treated as package bids that will feed into the winner determination problem
  - Package bid: An all-or-nothing bid for a set of regions
- In addition, bidders are permitted to submit collections of one or more additional package bids (“supplementary bids”)
  - Supplementary bids may improve upon clock bids
  - Supplementary bids also enable bidding on other relevant packages
  - Supplementary bids are limited by activity rule (similar to clock rounds)
- Following the supplementary round, the regulator solves the winner determination problem:
  - Find the selection of bids, at most one bid from each bidder, that maximizes the regulator’s objective subject to the budget constraint
- The winners’ payments are determined by a second-price-like approach (bidder-optimal core pricing)

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## Bidder-Optimal Core Pricing

- Motivation: Use a second-price-like rule, so as to encourage truthful bidding and thereby obtain efficient outcomes
- *Core allocations*: Allocations that are feasible and unblocked by any coalition
- Bidder-optimal core pricing identifies the smallest payments that are consistent with the core, generalizing second-pricing in a useful way
  - If the regions are substitutes, bidder-optimal core pricing coincides with Vickrey pricing: the winners form the value-maximizing assignment and each is paid its opportunity cost
  - If the regions are not substitutes, then the Vickrey prices are typically not in the core; bidder-optimal core prices will then be lower than the Vickrey prices

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## Activity Rule in Clock Rounds

Revealed preference with eligibility-point safe harbor:

- Eligibility for next round is minimum of current eligibility and size of current package
- Eligibility-reducing round is any round in which:  
Size of package bid on < Current eligibility
- Can always bid on packages that are the same size or smaller than your eligibility (eligibility-point monotonicity)
- Can bid on larger packages that satisfy revealed preference with respect to each prior eligibility-reducing round:

$$\text{At time } t' > t, (q_{t'} - q_t) \cdot (p_{t'} - p_t) \leq 0$$

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## Activity Rule in Supplementary Round:

“Revealed preference cap”:

- For packages = final clock package + any unallocated regions,
  - supplementary bid satisfies RP with respect to final clock round
- For all other packages,
  - supplementary bid satisfies RP with respect to final clock round
  - supplementary bid satisfies RP with respect to each eligibility-reducing round beginning with the last round in which the bidder had eligibility to bid on the package

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## Advantages of the CCA as an Auction Design

- Enables bidders to assemble rational combinations of regions
- Eliminates the “exposure problem” by utilizing package bids
- The clock rounds provide substantial price discovery and enhance the transparency of the auction process
- The use of bidder-optimal core pricing (instead of linear pricing) minimizes the incentives for demand reduction and improves the efficiency of the outcome
- Recent innovations in the activity rule (revealed-preference-based activity rules) enhance the possibilities for substitution
- Both the submission of supplementary bids and the use of all prior clock bids helps to maximize the regulator’s objective and to avoid problems arising from lumpy bids

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## Other Facets of the Auction Design

- While the competition in any given region may be limited, the combining of all regions into a single auction effectively enables one region to compete against another
  - As long as not all regions can receive funding, the marginal region receiving funding serves effectively as a reserve price against other regions
  - This diminishes the need to use cost and revenue models to set reserve prices for each region
- The fitting problem is less severe than in standard (forward) spectrum auctions
  - In spectrum auctions, the regulator cannot sell the same license twice, so two package bids with a tiny overlap are strictly incompatible
  - But in a universal service auction, there need not be any strict prohibition on two bidders winning the same region, so the problem of fitting together the package bids is less problematic

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## Other Comments: An Alternative Design

- Suppose that the regulator believes that it has reliable cost and revenue models
- Then the regulator can determine target levels of support for each region (“reference prices”)
- Can run a descending-clock auction with respect to the reference prices

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## Reference-Price Auction

- “Reference prices” are set for each region
- All regions are procured within a single descending-clock auction:
  - The auctioneer begins by naming prices equaling, for example, 120% of the reference prices
  - Bidders respond with the regions that they would wish to service at these prices
  - The process iterates, with progressively smaller percentages of the reference prices, as long as there is excess supply w.r.t. budget
  - Once budget is nearly met, process continues to eliminate excess supply for individual regions
  - Clearing occurs when there is no excess supply for individual regions and the remaining regions can be serviced within the budget

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## Other Comments: Limited Competition

- One general concern regarding universal service support for mobile is that the potential field of bidders may be artificially limited to holders of spectrum licenses in the given region
  - Sub-1-GHz spectrum is clearly the best for this purpose
  - Owners of sub-1-GHz licenses have failed to provide service in the relevant regions
  - Nevertheless, owners of sub-1-GHz licenses may block other carriers
- One solution:
  - Allow the winner of the universal service auction to “squat” on the sub-1-GHz spectrum of its choice
  - Such a rule would improve competition in the auction, providing greater service and at less public cost